Printed Pages:02 **Sub Code: NAS 201**

Paper Id: | **199243** | **Roll No.** | | | | | | | | | |

B. TECH.
(SEM-II) THEORY EXAMINATION 2018-19
ENGINEERING PHYSICS-II

Time: 3 Hours   *Total Marks: 100*

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **2 x 10 = 20**

    a. Describe the interplanar spacing in crystal structure.
    b. What are miller indices? How are they calculated?
    c. What is reciprocal lallice?
    d. What is internal field in dielectric?
    e. What does the area of hysteresis curve represents?
    f. Why Maxwell proposed that Ampere's circuital law required modification?
    g. What is skin depth? Write the equation for skin depth.
    h. Explain the effect of temperature on conductivity of semiconductor.
    i. What is the value of critical field of a superconductor at transition temperature?
    j. What are multiwall carbon nanotube?

SECTION B

2. **Attempt any *three* of the following:**   **10 x 3 = 30**

    a. Copper has FCC structure and its atomic radius is 1.5 A^0. Find the lattice parameter (a) and density (ρ) of copper. Atomic weight of copper (M) = 63.5 gm, Avogadro number (N) = 6.023×10^{26} atom/kg mole.
    b. The dielectric constant of helium measured at 0^0C and 1 atm. is 1.0000458. Under these conditions, the gas contains $3.7 \times 10^{25}/m^3$. Calculate the radius of the electron cloud. Also, calculate the displacement x when the atom is subjected to an electric field of value 10^5 V/m.
    c. If earth receives 2-cal/min/cm^{-2} solar energy, what are the amplitudes of electric & magnetic fields of radiation?
    d. Find the energy difference between the intrinsic level and Fermi level in intrinsic Si at 300K (m^*_e=1.1m, m^*_h=0.59m).
    e. For a specimen of V_3 Ga, the critical fields are 0.176 T and 0.528T for temp. 14 K & 13 K respectively. Calculate the transition temp. & critical fields at 0 K & 4.2 K.

SECTION C

3. **Attempt any *one* part of the following:**   **10 x 1 = 10**

    (a) Explain crystal structure of NaCl and Diamond.
    (b) Describe the Bragg's spectrometer and derive the necessary formula and explain how it is used to study the structure of crystal.

4. **Attempt any *one* part of the following:** **10 x 1 = 10**

   (a) Derive an expression for the internal field in solids.

   (b) What is diamagnetism? Show that susceptibility of diamagnetism material is negative and independent of temperature.

5. **Attempt any *one* part of the following:** **10 x 1 = 10**

   (a) Explain the concept of displacement current. How does it make the ampere's law valid for non-steady state?

   (b) What is pointing vector? Derive an expression for pointing theorem.

6. **Attempt any *one* part of the following:** **10 x 1 = 10**

   (a) What do you mean by electron distribution function? Derive an expression of density of energy state.

   (b) What is Fermi energy? Show how this energy depends on the density of electron gas.

7. **Attempt any *one* part of the following:** **10 x 1 = 10**

   (a) What do you mean by Meissner effect? Explain how Meissner effect proves the superconductor is a perfect diamagnetism material.

   (b) What are Bucky balls? How can Bucky balls be created? Where are buck balls used.